-ScyFlow – Control Flow / Work Flow

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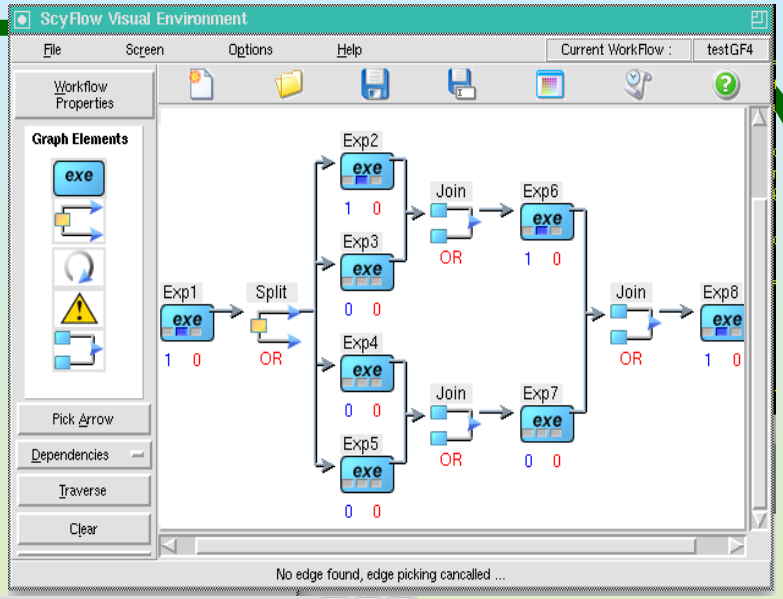
Some ScyFlow Characteristics

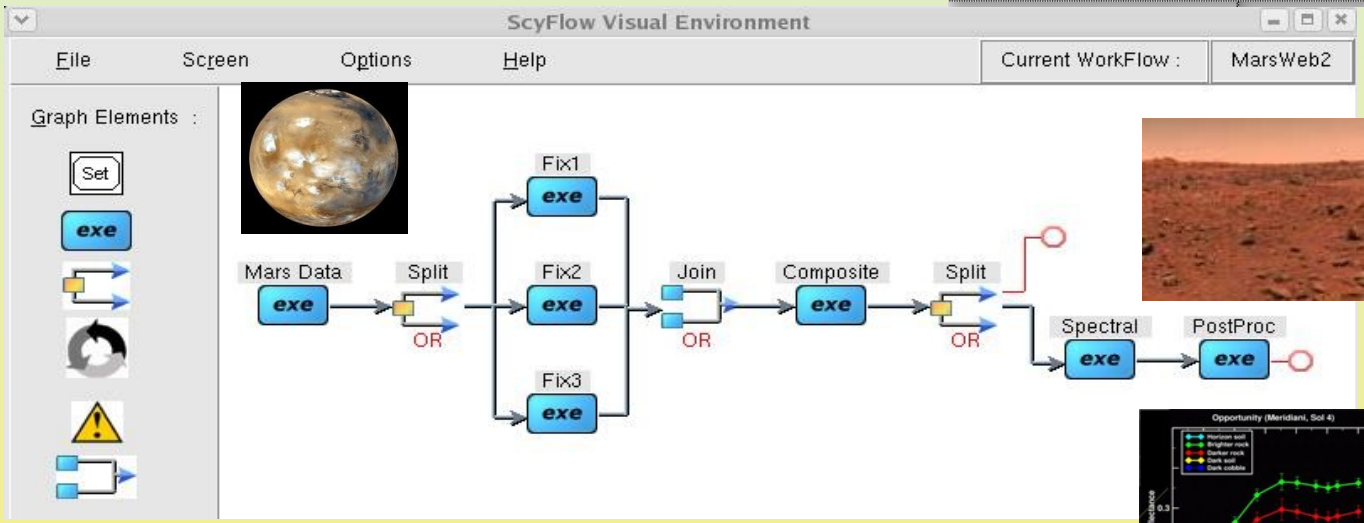
What is ScyFlow? Very simply: With ScyFlow, user creates a "flowchart" of their processing sequence, and then ScyFlow runs it!

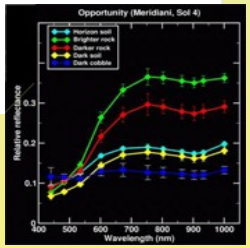
- **Transparent access to compute resources, local or remote, even your workstation**
- **Submits to clusters**
- **Each node of task graph can be**
  - **single process**
  - **a succession of processes**
  - **a parameter study**
- **Permits "parameter studies of parameter studies"**
- **Task submission, resource selection, output recovery, remote monitoring are all made trivial**
- **Can run multiple task-graphs at once.**
- **WorkFlow/Parameter Study results are managed and archived by the WorkFlow execution manager**
- **Pipelining of data is made transparent by automatic**

ScyFlow

Workflow editor and Real-time Monitoring Panel







Workflow for Automatic processing and classification of Rocks on Mars

Parts, Components, and Uses of the ScyFlow System

- **GUI "Front End"**
  - User can visually construct arbitrarily complex workflows (like flowchart)
  - Logistics (in-files, out-files, executable paths, resource requirements, target machines, etc)
    are requested by dialogs
  - Automated generation of PBS and LSF directives, when required
  - Graphical monitoring of jobs progress through task graph – like railroad-switch-yard monitor

- **API "Front End"** (under development)
  - Will substitute as proxy for GUI for automated or programmed running of WorkFlows

- **Communications code:**
  - Uses secure socket layer authenticated with public/private key security infrastructure for
    communication between GUI/API front-end and the Execution Engine back-end

- **"Back End" Execution Engine**
  - **Server** module that seamlessly processes user's task graph (generated by the Workflow
    composition GUI/API)
  - Distributes computational tasks onto resources/compute nodes
  - Manages execution of tasks, job stopping, etc
  - Monitors progress of the computational tasks, and manages output data
  - Server/Sub-Server based on real-time multiplexing non-blocking IO socket-communication
  - model for scaling

Parts, Components, and Uses of the ScyFlow System

Component Applications in the ScyFlow System

- **ScyFlow** WorkFlow editing and execution module; can run “stand-alone”
- **ScyLab** 2nd generation parameter study tool, can also run “stand-alone”, used by ScyFlow
- **ScyGate** container application, allows all modules to communicate
- **FileTester**: generates Perl code that will parse a file for a data value (utility program)
- **UniT**: generates Perl code that will translate data from one format to another (utility program)
- **ScySRB**: prototype application for interfacing SRB files with ScyFlow WorkFlow operations

Applications that ScyFlow can run NOW as WorkFlow or Parameter Studies

- Well, any application whatsoever, even GUI based programs requiring interaction
- Has already run Mars Petrology AI System (GFA), consisting of some programs and some scripts.
- The ScyLab Parameter Study Component has run a very wide variety of engineering programs,

  including Nastran, circuit solvers, CFD codes.
- The Job Handler interface is modular: it is easy to add new Job Handlers, e.g., for instrument

  reading or device control.

- ScyLab -
Production-Level Parameter Study Capabilities, both Local and Distributed

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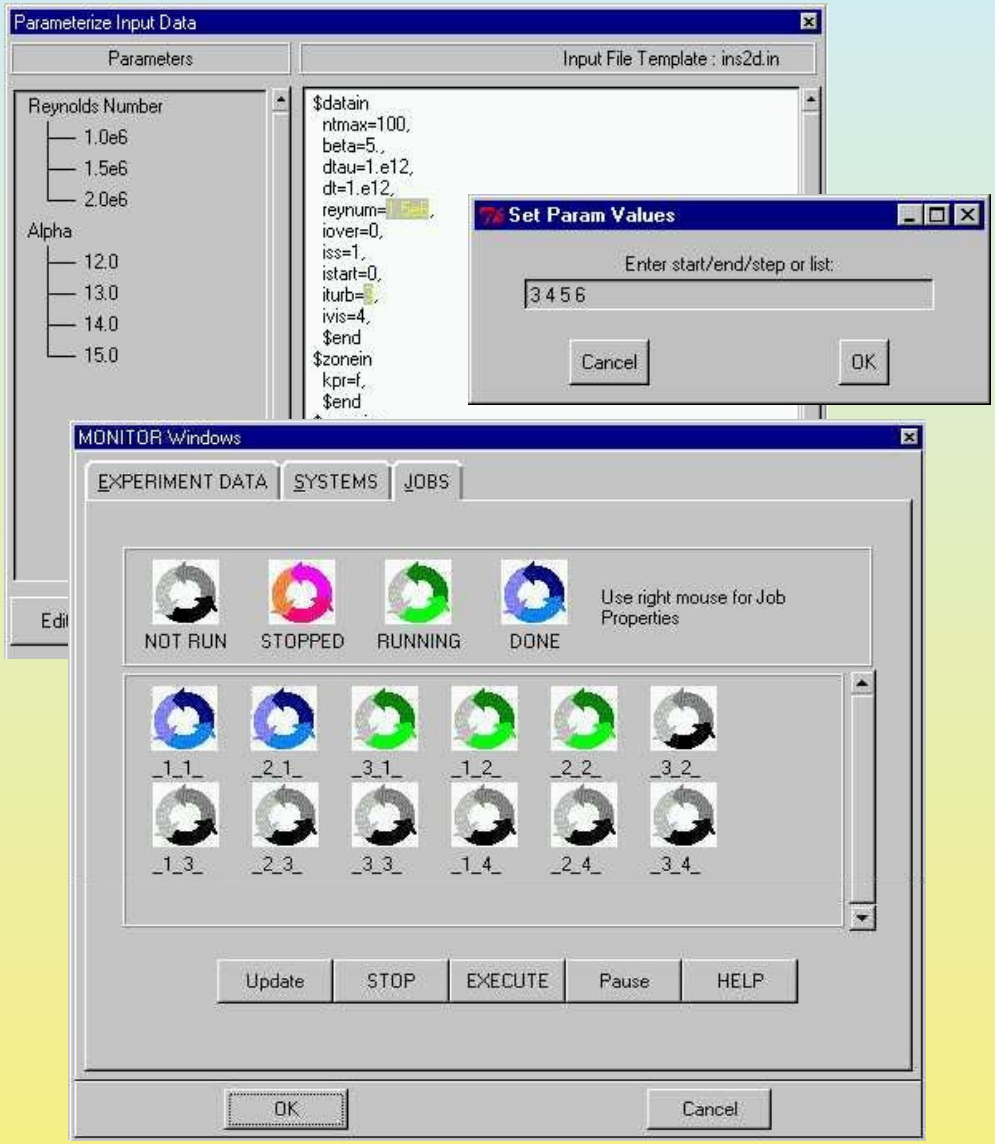
ScyLab Features

- Automated high throughput on multiple systems
- Transparent access to parallel schedulers and libraries
- Monitoring, logging, and archiving
- Ease of use : sophisticated GUI with built-in HELP, arbitrary parameterization with custom parameterizing editor
- API for programming access (without GUI)
- Restart capability for CFD usage or multi-discpl-optimiz
- Handles complex multistage processes
- Reduces design cycle time - by a factor of up to 100!
- Simple and rapid out-of-box experience
- Proven track record of success and user satisfaction:
  - » Users at Boeing (CFD applications, Nastran)
  - » Used at UC Davis for CFD studies
  - » NASA Ames users (Semiconductor Device Modeling, Rotorcraft blade modeling)
  - » Industry (Circuit Simulation)

Some More ScyLab Characteristics

- Arbitrary parameter studies of arbitrary number of parameter dimensions
- Great flexibility in parameterization capabilities, including
  - tuple-space param studies as well as Cartesian
  - special parameterizing editor: param study creation made trivial
- Used on clusters at Boeing, Glenn R.C., Ames R.C.
- Automated parameter study job launching with monitoring, job control
- Pre-processing and post-processing specification supported
- Multi-disciplinary optimization enabled by job-restart looping.



- Parameterization made simple and easy
- ILab is really a code generator: generates and submits scripts to execute parameterized jobs
- Absolutely no programming or scripting required
- Several Job Models, including Globus, PBS, LSF, Condor, MPI, local or remote, "ganged"
- Real-time monitoring of job status, job stopping, masking
- Organization and archiving of all "Experiment" data
- MRU and complete "history" secretarial features
- Built with Object-Oriented programming model